

# **REMOVAL ACTION MEMORANDUM**

## **Cashman Mill Site**

July, 2003

### **I. PURPOSE**

The purpose of this Removal Action Memorandum is to document the Forest Service decision to initiate a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. 9601 et seq.) non-time-critical Removal Action at the Cashman Mill Site (Site) located approximately 3 miles southeast of Skykomish, WA. It is anticipated that ARCO, with the cooperation of Joe B. Cashman and CSS Management Company (CSS), will perform the removal action selected by the U.S. Department of Agriculture - Forest Service (Forest Service) under an Administrative Order on Consent (AOC) or a Unilateral Administrative Order (UAO).

### **II. SITE CONDITIONS and BACKGROUND**

#### **A. Site Description**

##### **1. Removal Site Evaluation**

A mill was constructed on the Site in 1970 for the purpose of extracting precious metals from sulfide mineral ores extracted from local hard rock mining operations. The Apex Mill Site claims and the Cashman mill are owned and operated by Mr. Cashman and/or CSS. Several piles of mineralized materials are stored on the Site, referred to as Source Piles A, B, C, and D. Source Pile D is contained within a lined retention pond identified as Pond #2 (EE/CA Fig. 3). The recommended non-time critical removal action identified in the Engineering Evaluation/Cost Analysis (EE/CA) dated April, 2002 involved the removal and disposal of water in the lined retention pond as well as the removal of Source Piles A and D and underlying impacted soils exceeding established cleanup goals for the Site. In total, approximately 2,000 tons of mineral-bearing residue (Source Pile A), 800 to 1,200 tons of associated impacted soils, and approximately 100 cubic yards of residual mineralized materials from lined retention pond (Source Pile D) will be relocated for final disposal and/or treatment to the Anaconda Smelter NPL Site or such location(s) approved by EPA Region VIII under Anaconda Regional Water, Waste & Soils Operable Unit Record of Decision (ARWW&S ROD) for the Anaconda Smelter Site.

The Site was investigated as a potential CERCLA site following the Forest Service receipt of a February 21, 1992 Early Notice Letter from the State of Washington Department of Ecology (DOE). This letter stated that the Site was being placed on DOE's list of known or suspected contaminated sites based on an investigation DOE performed in November 1991. DOE's Toxic Cleanup Program and Hazardous Waste Section conducted a joint inspection of the site in January 1993. During their January 1993 site inspection, water samples collected by DOE from surface waters near Pile A indicated a total Arsenic concentration of 1.08 mg/l, exceeding Washington's acute water quality standard of 0.36 mg/l.

Results of the 1999 Site Inspection indicate that soils beneath Source Pile A contain concentrations of Antimony, Arsenic, Cadmium, Copper, Lead, and Mercury that are substantially above Site natural background levels. Arsenic and Cadmium also exceed the cleanup goals established for the Site (See Sec.II.A.4.). Sampling under Source Pile B shows elevated levels of Antimony and Copper when compared to Site natural background, but the levels do not exceed Site cleanup goals. No soil samples were collected under Source Pile C, but metals concentrations and leaching potential in Source Piles B and C are similar.

Sampling of groundwater monitoring wells (MW) adjacent to and down-gradient from Source Piles A and B (MW 1, 2 and 3) shows that groundwater has levels of Cadmium (up to 0.265 mg/l) exceeding the State's groundwater cleanup level of 0.005 mg/l (WAC 173-340-720).

Toxicity characteristic leaching procedure (TCLP) analysis was conducted on Source Piles A, B, C and D in September 2002. Results of this analysis show that Source Piles B, C, and D passed the analysis for the eight Resource Conservation and Recovery Act (RCRA) metals while Source Pile A failed this analysis for Cadmium and Lead.

## 2. Site Location

The Site is located at the intersection of Lowe Creek Road (Forest Service Road #6030) and the Old Cascade Highway in the northeastern part of King County in the NW1/4SW1/4 of Section 21, Township 26 North, Range 11 East, W.M., and is on the Skykomish Ranger District of the Mt. Baker-Snoqualmie National Forest (EE/CA Figures 1 & 3). Elevation of the Site is approximately 870 feet above mean sea level.

The nearest incorporated community is the Town of Skykomish, located approximately 3 miles southeast of the Site with an estimated population of 270. The community of Grotto is located 1 mile, and the Town of Baring approximately 5 miles, to the northwest of the Site. The Forest Service's Money Creek Campground (24 sites) is located less than ¼ mile to the north. Several undeveloped camping sites are located along nearby Money Creek and the South Fork Skykomish River. A parcel of private land, containing several lots with summer cabins, is located along Lowe Creek Road approximately ¼ mile west of the Site.

Nearby water wells include: the domestic and mill supply well located on the Site, a well located approximately 1/4 mile north of the Site supplying potable water to the Forest Service's Money Creek Campground, and the community of Grotto's water supply well located approximately 1 mile northwest of the Site.

Money Creek runs parallel to the Site within 100 feet of the Site's southerly boundary, and empties into the South Fork Skykomish River less than ¼ mile downstream. These waters have the State of Washington's highest water quality classification of AA, and have known populations of Bull Trout and Chinook Salmon. Wintering Bald Eagles are also known to inhabit the area from early October through mid March. These species are afforded protection under the Endangered Species Act.

## 3. Site Characteristics

The Site is comprised of two 5-acre mill site claims, Apex Mill Site Claim #1 and Apex Mill Site Claim #2. These claims are located on National Forest System Lands (NFSL) and were located in 1969 under the authority of the General Mining Law of 1872. Apex Mill Site Claim #1 contains a milling facility, a repair building, a lab building, a security residence, two water supply wells, two septic tanks, a pool building (also used for fire protection water supply), and other features consistent with a mill site such as conveyer belts and crushing equipment (EE/CA Figure 3). With the exception of the areas occupied by the mill buildings, Source Piles A, B, & C and Pond 2, the Site is heavily vegetated, primarily with 20 to 30 year old alder and cottonwood trees, willow, salmonberry and blackberry.

The exact quantity of ore processed at the mill is not known. It is known that 15 tons (50 drums) of flue dust were transported to the Mill from the Anaconda Smelter in Anaconda, Montana. The 15 tons of flue dust were the subject of pilot testing for remediation of the Anaconda Smelter site and were transported back to the Anaconda Smelter in February 1989.

Another pile of flue dust was transported to the Site around 1983. This flue dust and underlying contaminated soils were removed from the Site under a time-critical removal action completed by ARCO in 1997 (refer to section II.B). Further characterization of soils down gradient of the former flue dust removal site (see Section II.B.1. Previous Actions) was conducted by XRF analysis on April 30, 2002. This analysis did not identify any soil concentrations above established Site cleanup levels (XRF Analysis - Table 17).

Source Pile A (2,000 tons), is material that was transported to this Site from a location at or near the Anaconda Smelter site in 1990. In November 1994 and February 1995, pilot testing of approximately 3 tons of material from Source Pile A was conducted by CSS Management Corp. under an approved Plan of Operations. Source Piles B (1,000 tons) and C (200 tons) are ores, believed to have been brought to the Site from local mines in the early 1980's. Source Piles A, B and C have been placed on bare ground/native soils and have been uncovered for much of their storage life. Source Pile D (100 cubic yards)<sup>1</sup> is residual mineralized material believed to be waste, or partially processed material, from on-site milling operations, reportedly from Source Pile A, and is present as a sediment under the water in Pond 2. Pond 2 contains an estimated 530,000 gallons<sup>1</sup> of liquid, believed to be comprised primarily of collected rainwater.

This will be the second removal action performed at the Site.

#### 4. Release or Threatened Release of a Hazardous Substance

Recent changes to the State of Washington's cleanup regulations under Chapter 173-340 WAC, Model Toxics Control Act (MTCA) and EPA's Preliminary Remediation Goals have resulted in changes to the cleanup goals established for the Site in the April 2002 EE/CA.

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<sup>1</sup> Based on actual field measurements made on April 26, 2002 by ARCO and CSS Management Corp. represented by SRW Consulting, these quantities have been revised downward from the EE/CA estimated values of 760 tons and 800,000 gallons respectively. EE/CA cost estimates have not been revised since these changes apply equally to all alternatives and do not affect identification of the EE/CA recommended alternative. Adjustments will be made during the design phase of the selected removal action.

The following table displays the current standards as well as background concentrations for the six identified constituents of concern (COC's). Consistent with the methodology used to establish the previous cleanup goals, the more restrictive standard (in bold print) has been adopted unless limited by background. Analytical results for Source Piles A and D along with impacted soils beneath Source Pile A are provided for comparison to the established cleanup goals.

Parameter	Units	MTCA Method A Soil Cleanup Levels	EPA Region IX PRGs for Industrial Soils	Background Concentrations at Site	Source Pile A	Impacted soils beneath Pile A	Source Pile D
Antimony	mg/kg	no value	<b>410</b>	0.98	.8-200	.3-9	70-430
Arsenic	mg/kg	20	260	<b>408</b>	101-14,700	39.9-850	7,510-19,700
Cadmium	mg/kg	2	450	<b>3.4</b>	2.9-1,210	12.7-82	30-75
Copper	mg/kg	no value	<b>41,000</b>	205	146-121,000	40-4,200	4,070-15,400
Lead	mg/kg	1,000	<b>750</b>	87	15.9-16,000	16.8-687	4,810-8,500
Mercury	mg/kg	<b>2</b>	310	0.24	20-44.9	.05-.87	3.6-8.5

Cadmium concentrations in MW 1, 2 and 3, located adjacent to and down-gradient from Source Piles A and B, ranged from 0.0109 mg/l to 0.265 mg/l (EE/CA Table 9 & Table 2 & 3, Sept. 2002 groundwater analysis), 2 to 53 times maximum contaminant level (MCL) and groundwater cleanup level of 0.005 mg/l.

The fact that the significant Cadmium concentrations are found in Source Pile A (60 times higher than B, C) and in the adjacent underlying soils (68 times higher than B), indicates that it is the primary source of the Cadmium contamination in groundwater at the Site. Due to the relatively high levels of Cadmium in soils under Source Pile A at the 18"-24" depth, Cadmium is expected to be the constituent that will drive the soil cleanup at the Site. The primary trigger for the releases is likely due to the improper storage of the materials (placed on bare ground, much of the time without adequate cover), and the fact that the Site receives high precipitation levels, averaging nearly 110 inches per year.

Analysis of water samples from Pond #2 (EE/CA Table 8 & Table 1, Aug. 2002 analysis) shows Arsenic concentrations of .0021 to 0.37 mg/l, the only constituent to be identified as a concern if the water were to be released to the surface, where it potentially could affect the groundwater.

Releases or potential releases of contamination at the Site are as follows:

- Airborne material from Source Piles
- Leaching of contaminants into soils underlying Source Piles
- Leaching of contaminants into groundwater
- Migration of contaminants via surface runoff into surface drainages adjacent to the Site.

#### 5. NPL Status

The Site has not been scored under EPA's Hazard Ranking System (HRS), and is not proposed for listing on the National Priorities List (NPL).

#### 6. Additional Site Information

Additional Site information, including maps and comparative tables, can be found in the Engineering Evaluation/Cost Analysis dated April 22, 2002.

### **B. Other Actions to Date**

#### 1. Previous Actions

Approximately 800 tons of flue dust, believed to have originated from the Anaconda Company Smelter NPL Site, was previously stored at the Site (brought to the Site around 1983). This flue dust was addressed in a time-critical removal action initiated by ARCO in 1997 under a Unilateral Administrative Order (UAO). Approximately 1,850 tons of flue dust and adjacent contaminated soils were removed from the Site, and disposed at a RCRA Subtitle C disposal facility in Grassy Mountain Utah. ARCO's reported cost for this removal was \$515,310. Current information provided by the April 2002 XRF sampling and existing groundwater data, indicates that this removal has been effective and that no further actions related to the flue dust are warranted.

Source Pile A (2,000 tons), is material that was transported to this Site from a location at or near the Anaconda Smelter site in 1990. Source Pile D (100 cubic yards)<sup>1</sup> is residual mineralized material believed to be waste, or partially processed material, from on-site milling operations, reportedly from Source Pile A, and is present as a sediment under the water in Pond 2.

DOE's Toxic Cleanup Program and Hazardous Waste Section conducted a joint inspection of the site in January 1993. Forest Service investigations at the Site include:

- Preliminary Assessment (PA) by Olympus Environmental, Inc. (March 1996)
- Site Inspection (SI) performed by Cascade Earth Sciences, Ltd. (CES) (Sept. 1999)
- Additional Site characterization and Engineering Evaluation/Cost Analysis (EE/CA) by CES (Sept. 2001)
- Revised EE/CA by CES (April 2002)
- Forest Service XRF soil sampling (April 2002)
- Updated sampling and analysis of water in Pond #2 (ARCO, August, 2002)
- Updated monitoring well sampling and analysis and toxicity characteristic leaching procedure (TCLP) analysis on Source piles (CES, September 2002).

2. Current Actions

There are no current removal actions at the Site.

**C. State and Local Authorities Role**

1. State and Local Actions to Date

State of Washington Department of Ecology (DOE) was actively involved during the flue dust removal. DOE was involved in the Site Inspection (SI), Engineering Evaluation/Cost Analysis (EE/CA) and in the revised EE/CA as well as addressing the dewatering issue associated with the pond. No local authorities have been actively involved in the project.

2. Potential for Continued State and Local Response

DOE remains interested in the project and is expected to continue with its monitoring role.

**III. THREATS to PUBLIC HEALTH or WELFARE or the ENVIRONMENT, and STATUTORY and REGULATORY AUTHORITIES**

**A. Threats to Public Health or Welfare**

Based on the documents of record, there is a threat to public health or welfare as set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 CFR 300.415(b)(2).

The general public is reasonably well protected from direct human exposure to Source Piles A, B, C, and D through the on-site security residence and fencing which encompasses that portion of the site adjacent to Lowe Creek road. Source Piles A and B are partially protected with sheet plastic and netting, Source Pile C has no covering, and a portion of Source Pile D is exposed in the NE corner of Pond #2. Direct human exposure is possible to on-Site residents, visitors to the site, occupants of the nearby 24 site developed campground, and occupants of the nearby undeveloped recreation sites along Money Creek and the South Fork Skykomish River. Access to the piles is feasible along the shores of Money Creek, or more directly from the adjacent Lowe Creek Road when there is no on-Site presence. Concentrations in Source Piles A and D are as high as: 430 mg/kg for Antimony; 19,700 mg/kg for Arsenic; 1,210 mg/kg for Cadmium; 121,000 mg/kg for Copper; 16,000 mg/kg for Lead; and 45 mg/kg for Mercury (EE/CA Table 4).

The established cleanup levels for soils at the site are in accordance with applicable State regulations outlined in MTCA (Washington Administrative Code, Chapter 173-340). The cleanup standards for the constituents of concern at the Site are derived from a cancer risk of less than one in one hundred thousand for direct dermal contact and/or protection of groundwater for drinking water use. Lead is the only exception in that it is based on preventing unacceptable levels in blood.

Source Piles A, B and C have been stored directly on unprotected soils. These soils are comprised of course-grained sands and gravels, providing little protection to the downward

migration and leaching of contaminants. Samples from MW 1, 2 and 3 show that shallow (8-10 feet) groundwater has concentrations of Cadmium of up to 0.265 mg/l, exceeding the MCL for drinking water, and DOE's groundwater cleanup level of 0.005 mg/l. Continued leaching is threatening drinking water supplies located on-site and in the nearby Money Creek campground.

## **B. Threats to the Environment**

There is a threat to the environment as set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 CFR 300.415(b)(2). Threats and potential threats to the environment identified in the EE/CA include:

- Continued leaching of contaminants into soils underlying the Source Piles
- Continued leaching of contaminants into groundwater
- Migration of contaminants via surface runoff to surface water drainages.
- Terrestrial wildlife exposure to high levels of Antimony (430 mg/kg), Arsenic (19,700 mg/kg), Cadmium (1,210 mg/kg), Copper (121,000 mg/kg), Lead (16,000 mg/kg), and Mercury (45 mg/kg) in Source Piles A and D.

Releases from Source Pile A have migrated into the sub-soils and have leached to the shallow groundwater. Cadmium concentrations in the shallow groundwater exceed the MCL for drinking water and DOE's groundwater cleanup standard. Contaminated groundwater has the potential to reach surface waters of Money Creek and the South Fork Skykomish River, potentially affecting valuable fisheries habitat.

For a detailed comparison of metals concentrations in the Source Piles, impacted subsurface soils, and groundwater to Site cleanup standards, refer to Section II. A. 4.

## **IV. ENDANGERMENT DETERMINATION**

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health or welfare, or the environment.

## **V. PROPOSED ACTIONS and ESTIMATED COSTS**

### **A. Proposed Actions**

The EE/CA considered nine alternatives for addressing Source Piles A, B, C and D and the adjacent contaminated soils:

- No action
- Institutional controls
- Engineering controls
- Reprocessing (Cashman Process)
- Off-site disposal without treatment (Alternative 1)
- Stabilization/fixation and off-site disposal (Alternative 2)
- Soil washing and off-site disposal (Alternative 3)

- Vitrification (Alternative 4)
- Direct removal/relocation without treatment (Alternative 5)

No action, institutional controls, engineering controls and reprocessing (Cashman Process) were screened from further consideration and evaluation due to concerns in meeting EE/CA removal action objectives and/or implementability issues. Refer to the EE/CA for discussion of these issues, and the comparative analysis of effectiveness, implementability and cost for the alternatives recommended for consideration. Alternative 5 – Direct Removal/Relocation Without Treatment, is the EE/CA recommended alternative.

#### 1. Proposed Action Description

In total, approximately 2,000 tons of mineral-bearing residue (Source Pile A), 800 to 1,200 tons of associated impacted soils, and approximately 100 cubic yards of residual mineralized materials from lined retention pond (Source Pile D) will be relocated for final disposal and/or treatment to the Anaconda Smelter NPL Site or such location(s) approved by EPA Region VIII under ARWW&S ROD for the Anaconda Smelter Site.

Prior to removal of materials, erosion control measures will be employed to prevent migration of materials into adjacent ditches, ponded surface waters and live streams. Analysis of the excavated subgrade will be performed using a portable XRF and/or laboratory analysis to define the excavation limits and final verification sampling via laboratory chemical analysis will be performed for final approval of the excavated area to ensure that the remaining soils meet the established cleanup goals for the Site. Details of the confirmation sampling are outlined in ARCO's Removal Action Work Plan dated June, 2003. Upon completion of excavation of contaminated soils under Source Pile A, the area will be backfilled with suitable material to restore the area to original contours. Industrial uses at the Site are expected to continue; therefore, revegetation of this area is not anticipated.

Institutional controls will be implemented to identify the Site as an industrial property in the Forest Service land status records. This information will be used to guide future decisions on use of the property once the current industrial operations are no longer active.

Groundwater will be monitored on at least an annual basis to evaluate whether natural attenuation is successful in cleaning up the groundwater. Monitoring will continue until analysis results from two consecutive years shows that groundwater standards have been met or exceeded.

#### 2. Contribution to Remedial Performance

Together with the flue dust removal completed in 1998, this action is expected to contribute substantially to the cleanup of the Site. Natural attenuation of the groundwater is anticipated. Upon confirmation of attainment of groundwater cleanup, the Site is expected to be fully remediated, with the exception of the remaining contamination contained in Source Piles B, and C, and any adjacent soils exceeding cleanup standards associated with these piles and the area around the mill buildings. In a proposed plan of operations dated June 21, 2002 as amended on August 2, 2002 and September 19, 2002, CSS proposes to address this contamination by processing Source Piles B and C using the on-site milling equipment. Any

contaminated soils under and adjacent to Source Piles B and C, the areas around the mill buildings and the waste from processing Source Piles B and C, would be disposed at an approved RCRA facility. This work would be done under an approved Plan of Operations, in accordance with Forest Service regulations contained in 36 CFR 228 A. If approved and implemented, this phase of work would be outside the CERCLA process.

The rationale for not including these materials in the proposed action is supported by the evidence that Source Pile A is the primary source of contaminated soils exceeding site cleanup goals and the primary source of Cadmium in the groundwater. In reviewing the analysis of soils under Source Piles A and B, none of the samples taken under Source Pile B exceed Site soil cleanup goals, while all of the samples taken under Source Pile A exceed cleanup standards for Cadmium, and one exceeds the cleanup standard for Arsenic (EE/CA Table 5). Cadmium concentrations in Source Pile A are up to 60 times that of Pile B (EE/CA Table 4). Although no samples were taken under Source Pile C, this material exhibits Cadmium concentrations similar to that of Source Pile B (EE/CA Table 4) and also exhibits similar acid-base (leaching) potential. Although sampling adjacent to the main mill building identified significant levels of contamination for Arsenic, Cadmium, Copper and Lead, the quantities are estimated to be less than 10 tons.

Although they do not appear to have contributed to the cadmium contamination in the ground water, Source Piles B and C do contain hazardous substances that appear to have been released to adjacent soils (Antimony and Copper, EE/CA Table 5). The levels of contamination currently known to be in the sub-soils do not exceed the established cleanup goals. The Forest Service continues to work with CSS to address these materials under a Plan of Operation. If an acceptable Plan of Operation cannot be achieved, further CERCLA action to address these materials may be warranted. Long-term use of the site will continue to be for industrial uses as a millsite or as dictated by the Mount Baker-Snoqualmie Forest Plan.

### 3. Description of Alternative Technologies

This proposed action removes those materials associated with the more significant problems at the Site to Anaconda, Montana to be combined with approximately 12,000 tons of similar material, where final disposition of the materials will be addressed by EPA Region VIII through Remedial Action. Remedial Action alternatives for these materials in Montana have not yet been developed.

An alternative technology, the Cashman Process, was considered during development of the EE/CA. This alternative was not considered viable for detailed evaluation due to the need for additional testing and the lack of an AOC to implement the alternative. Further information on the process can be found in Section 4.3.4 of the EE/CA.

4. EE/CA

An Engineering Evaluation/Cost Analysis was prepared by Cascade Earth Sciences and the Forest Service for this action. The full text of the EE/CA and the response to significant comments is incorporated by reference. To assist in review of this Action Memorandum, the following documents have been attached: the Executive Summary, Figures 1 and 3 and Tables 4, 5, 8 & 9 from the April 2002 EE/CA; Tables 16 and 17 from the April 2002 XRF analysis; Table 1 from the August 2002 Pond 2 water analysis; and Tables 1, 2 & 3 from the September 2002 ground water and TCLP analysis.

5. ARARs

The ARARs for the Site can be found in Appendix D of the EE/CA.

6. Project Schedule

It is expected that this action will take approximately one month to complete on-site actions and would be implemented in the fall of 2003.

**B. Estimated Costs**

Total costs for the removal action are estimated to be \$355,000.

**VI. EXPECTED CHANGE in the SITUATION SHOULD ACTION be DELAYED or NOT TAKEN**

If this action is delayed or is not taken, the continued migration and leaching of contaminants, particularly Arsenic and Cadmium, into underlying soils and shallow groundwater will occur. Concentrations of these constituents are likely to migrate deeper into the adjacent soils and shallow groundwater, increasing the threat of contamination of nearby sources of drinking water and potentially having an adverse effect on surface water quality.

**VII. OUTSTANDING POLICY ISSUES**

None.

**VIII. DECISION**

Section V of this Action Memorandum describes and documents the selected Removal Action for the Cashman Mill Site on the Mt. Baker-Snoqualmie National Forest. This Removal Action was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based upon the Administrative Record for the Site.

**Recommended By:**   /s/ John Phipps   **Date:** **07/10/2003**

**JOHN PHIPPS**  
Forest Supervisor  
Mt. Baker-Snoqualmie National Forest

**Approved By:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**RICHARD W. SOWA**  
Director of Engineering  
Pacific Northwest Region